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Growth and Change in Structure of an Aspen Stand After a Harvest Cutting

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Growth

This report covers growth of quaking aspen (*Populus tremuloides* Michx.) on the Hart Prairie aspen plot for the 20 years, 1942-62. A previous report in 1949 covered the first 5 years of the study.² The small plot (0.12 acre), located 14 miles northwest of Flagstaff on the west slope of the San Francisco Peaks, contained 101 trees (857 per acre with a basal area of 69 square feet) when it was established in 1942 after a commercial cutting. Residual trees ranged from 2 to 8 inches in diameter (average 3.9) with half in the 2- and 3-inch classes (table 1), and averaged 50 years old. The residual merchantable volume³ totaled 854 cubic feet, or 13.6 cords per acre in trees 4 to 8 inches in diameter.

Increment of the original merchantable trees in the plot is still good, although growth declined over the 20-year period. Periodic annual increment of these trees was 84.0 cubic feet³ per acre for the 20 years, compared to 86.4 for the 10 years from 1942-52 and 88.0 cubic feet for the first 5 years from 1942-47. Trees reaching merchantable size during the 20 years accounted for an additional 11.8 cubic feet annually. Total annual net volume growth was 95.8 cubic feet, or 1.3 cords per acre (table 2). Average diameter of all trees, including those still of unmerchantable size, is 6.0 inches with a basal area of 142 square feet per acre (table 1). Basal area and volume more than doubled during the 20-year period.

Change Of Stand Structure

Trees 4 inches in diameter and larger made good diameter and volume growth. The larger trees maintained better vigor and made better growth than trees in the lower diameter classes, and none of them died between 1942 and 1962. On an acre basis, 136 trees in the 2-, 3-, and 4-inch diameter classes were killed by Cytospora canker or suppression during the 20 years. Cytospora canker is common in the San Francisco Peaks area. No restocking from sprouting took place (fig. 1).

¹Forest Research Technician, located at Flagstaff, in cooperation with Arizona State College; central headquarters are maintained at Fort Collins, in cooperation with Colorado State University.

²Herman, F. R. Growth of aspen following partial cutting. U. S. Forest Serv., Southwest. Forest and Range Expt. Sta. Res. Note 117, 3 pp. 1949.

³Partial volume--cubic contents of the peeled stem above a 1-foot stump to a 3-inch top diameter.

Table 1. --Growth and change in structure by diameter class of aspen on the Hart Prairie plot, near Flagstaff, Arizona, 1942-62

Diameter class in inches	Trees			Basal area			Volume ¹			Annual increment	
	1942	1952	1962	1942	1952	1962	1942	1952	1962	1942-52	1942-62
	- - Number - -			Square feet			Cubic feet			Cubic feet	
1	0	0	0	0	0	0	0	0	0	0	0
2	32	12	3	.83	.34	.10	9.0	4.0	1.2	-.5	-.4
3	20	22	16	1.03	1.09	.87	14.0	14.5	12.2	.1	-.1
4	25	17	11	2.27	1.57	1.01	42.9	29.2	19.0	-1.4	-1.2
5	14	17	13	1.85	2.49	1.88	39.6	54.5	41.1	1.5	.1
6	7	16	14	1.33	3.16	2.85	30.6	72.8	66.1	4.2	1.7
7	2	8	12	.52	2.17	3.26	12.4	51.9	78.0	3.9	3.3
8	1	3	9	.34	1.08	3.14	8.3	26.2	76.5	1.8	3.4
9	0	2	4	0	.95	1.75	0	23.4	43.0	2.3	2.2
10	0	0	1	0	0	.58	0	0	14.0	0	.7
11	0	0	2	0	0	1.34	0	0	31.7	0	1.6
Total:											
Plot	101	97	85	8.17	12.85	16.78	156.8	276.5	382.8	12.1	11.4
Per acre	857	823	722	69.3	109.1	142.5	1331.0	2347.2	3250.0	102.7	96.7

¹ Entire unpeeled stem.

Table 2. --Periodic annual increment per acre of aspen on the Hart Prairie plot, near Flagstaff, Arizona, 1942-62

Aspen stand	1942-52		1942-62	
	Cu.ft. ¹	Cords	Cu.ft. ¹	Cords
Trees 3.6 in. and larger at time of plot establishment	86.4	1.2	84.0	1.1
Ingrowth: Trees growing into merchantable size (3.6 in. d.b.h.)	12.4	.2	11.8	.2
Total stand	98.8	1.4	95.8	1.3

¹ Merchantable.

Values

The scenery, recreation, watershed cover, and wildlife food provided by aspen stands are immeasurable in terms of dollars. Aspen stands also act as a nurse crop for conifers. Scenic and recreational values (fig. 2), which are especially important, may outweigh other uses at this time.

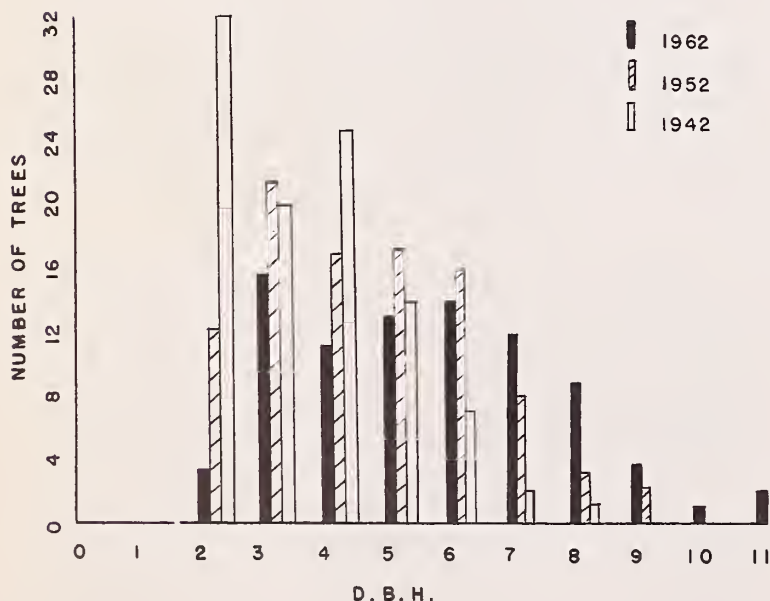


Figure 1. --Change in structure of Hart Prairie aspen plot over a 20-year period.



Figure 2. --An aspen stand on west slope of the San Francisco Peaks.